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PATENT & TRADEMARK OFFICE

PATENT APPLICATION
Mo6418
MD01-49

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION OF	
JAN L.R. CLATTY	GROUP ART UNIT: 1711
SERIAL NUMBER: 09/876,778	EXAMINER: John M. Cooney
FILED: June 7, 2001	
TITLE: POLYURETHANE FOAMS HAVING IMPROVED HEAT SAG AND A PROCESS FOR THEIR PRODUCTION	

RESPONSE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is in response to the Board of Appeals decision in the above-identified application dated September 30, 2004. A Separate Petition to Revive this case is enclosed.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an enveloped addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 3/3/05
Date

Lyndanne M. Whalen, Reg. No. 29,457
Name of applicant, assignee or Registered Representative

Signature

March 3, 2005
Date

REMARKS

In its decision of September 30, 2004, the Board held that Applicants' Claims 1-7 were *prima facie* obvious in view of the teachings of Kurth (U.S. Patent 6,180,686) in the absence of objective evidence of unexpected results.

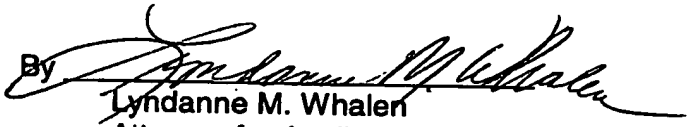
In response, enclosed is a copy of the Declaration of Jan L. Clatty in which such objective evidence is presented. More specifically, the enclosed Declaration reports and discusses the results of experiments conducted with varying amounts of vegetable-based polyol.

The data and Exhibits presented in Ms. Clatty's Declaration clearly show that use of a bio-based polyol in the amounts required by Applicant's claims produces rigid polyurethanes having both a higher Flex Modulus and a higher Heat Distortion Temperature than polyurethanes made with those same polyols in amounts greater than 30% (i.e., amounts outside the range required by Applicant's claims).

This combination of properties is neither taught nor suggested by the Kurth disclosure.

Applicant therefore believes that her invention as claimed in Claims 1-7 is not rendered obvious by the teachings of Kurth and respectfully requests that Claims 1-7 be allowed.

Respectfully submitted,

By 
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PATENT APPLICATION
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION OF	
JAN L. CLATTY	GROUP ART UNIT: 1711
SERIAL NUMBER: 09/876,778	EXAMINER: JOHN M. COONEY
FILED: JUNE 7, 2001	
TITLE: POLYURETHANE FOAMS HAVING IMPROVED HEAT SAG AND A PROCESS FOR THEIR PRODUCTION	

DECLARATION UNDER 37 CFR 1.132

I, Jan L. Clatty of 909 Tottenham Drive, Moon Township, PA 15108 declare as follows:

1. I studied Chemistry at Penn State University and obtained a Bachelor of Science degree in 1984. Since 1986 I have been employed by Bayer MaterialScience LLC and its predecessor companies in Pittsburgh, PA to do research and development work in the area of polyurethane foams and elastomers. My current position is Principal Scientist in the Polyurethanes RIM Elastomers and Foams Department.

2. I am the inventor of the subject matter being claimed in the above-identified United States patent application.

3. I have read and am familiar with the disclosures made in WO 00/23491 and in U.S. Patent 6,180,686 which have been cited against the claims pending in the above-identified application.

4. In order to demonstrate that the invention claimed in the above-identified application is significantly different from the developments disclosed in WO 00/23491 and in U.S. Patent 6,180,686, I performed or supervised the experiments described below.

EXPERIMENTS

The following starting materials were used in these Experiments:

SOY A	a polymerized soybean oil having a hydroxyl functionality of 1.8, a hydroxyl number of 51.8 and an equivalent weight of 1100 which is commercially available under the name SoyOyl P38.05 (low odor) from Urethane Soy Systems Co., Inc.
SOY B	a polymerized soybean oil having a hydroxyl functionality of 3, a hydroxyl number of 174 and an equivalent weight of 322 which is commercially available under the name SoyOyl P38.GC5 from Urethane Soy Systems Co., Inc.
SOY C	a polymerized soybean oil having a hydroxyl functionality of 3.4, a hydroxyl number of 65.8 and an equivalent weight of 850 which is commercially available under the name SoyOyl P56.05 from Urethane Soy Systems Co., Inc.
POLYOL A	Glycerol-started polyether of propylene oxide having a functionality of 3 and a hydroxyl number of 1050 (molecular weight about 160)
POLYOL B	A glycerol-started polyether of propylene oxide and ethylene oxide (83 wt.% propylene oxide and 17 wt.% ethylene oxide) having a hydroxyl number of 28 and a functionality of 3.
DC 193	Silicone surfactant available as Dow Corning 193 from Dow Corning Corporation.
PU-1748	A quaternary ammonium salt of the amide of tall oil and N,N' dimethyl-1,3-diamine propane.

ISO modified diphenylmethane diisocyanate having an NCO content of 27% by weight which is commercially available from Bayer MaterialScience LLC under the name Mondur 486.

General Procedure:

An isocyanate-reactive component composed of the materials listed in TABLE A or TABLE B in the amounts indicated in parts by weight in TABLE A or TABLE B was prepared. This isocyanate-reactive component was then reacted with ISO in an amount such that the Isocyanate Index was 110. The ISO and isocyanate-reactive component were mixed using an air mixer and hand cast or poured into an aluminum lab mold. The Flex Modulus and Heat Distortion Temperature of the molded articles are graphically presented in either Exhibit A (Experiments 1-13) or Exhibit B (Experiments 1 and 14-17).

The Compression Strength, Flex Modulus and Heat Distortion Temperature for each polyurethane foam made are reported in TABLE A or TABLE B. The Flex Modulus and Heat Distortion Temperature of the rigid, closed-cell polyurethane foams made in these Experiments are plotted against the % Soy Polyol in the isocyanate-reactive component in either the attached Exhibit A or Exhibit B.

The Flex Modulus was determined in accordance with ASTM D 790 and is reported in Exhibits A and B in 10^3 psi and graphically presented in Exhibits A and B.

The Compression Strength was determined in accordance with ASTM D 695 @ 25% and is reported in psi in TABLES A and B.

Heat Distortion was determined in accordance with ASTM D 648 Temperature @ 66 psi and is reported in °C in TABLES A and B and graphically presented in Exhibits A and B.

Experiments 1-13

No soy-based polyol was included in the isocyanate-reactive component used in control Experiment 1.

In each of experiments 2-13, the isocyanate-reactive component did include one of three different soy-based polyols in the amount indicated in TABLE A. In each of these experiments, the soy-based polyol was simply added to the isocyanate-reactive component used in control Experiment 1. The amount of isocyanate used was adjusted to compensate for the increased amount of reactive hydroxyl groups and to maintain the NCO Index at 110.

TABLE A

Experiment/ Material	1*	2	3	4	5	6	7	8	9
SOY A (pbw)	0	0	0	0	0	0	0	0	0
SOY B (pbw)	0	0	0	0	0	1	5	10	30
SOY C (pbw)	0	1	5	10	30	0	0	0	0
POLYOL A (pbw)	55	55	55	55	55	55	55	55	55
POLYOL B (pbw)	45	45	45	45	45	45	45	45	45
DC 193 (pbw)	3	3	3	3	3	3	3	3	3
PU-1748 (pbw)	6	6	6	6	6	6	6	6	6
WATER (pbw)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
% SOY[1]	0	1	4	8	21	1	4	8	21
HDT @ 66 psi (°C)	58	58	57	55	54	69	67	66	63
Compression Strength @ 25%	4474	4459	4533	4120	3930	5028	4883	4656	4203
Flex Modulus (10^3 psi)	161	162	154	147	116	179	173	163	135

pbw = parts by weight

* Comparative Experiment

[1] % SOY - wt% of vegetable-based polyol present in isocyanate-reactive component

TABLE A (cont'd)

Experiment/ Material	10	11	12	13
SOY A (pbw)	1	5	10	30
SOY B (pbw)	0	0	0	0
SOY C (pbw)	0	0	0	0
POLYOL A (pbw)	55	55	55	55
POLYOL B (pbw)	45	45	45	45
DC 193 (pbw)	3	3	3	3
PU-1748 (pbw)	6	6	6	6
WATER (pbw)	0.7	0.7	0.7	0.7
% SOY[1]	1	4	8	21
HDT @ 66 psi (°C)	56	58	57	54
Compression Strength @ 25%	2269	4529	4218	3820
Flex Modulus (10^3 psi)	161	155	157	110

pbw = parts by weight

[1]% SOY = wt% vegetable-based polyol in isocyanate-reactive component

As can be seen from TABLE A and Exhibit A, there were slight differences in Flex Modulus and Heat Distortion Temperature for the foams due to differences in the soy-based polyol. However, simply adding the soy-based polyol to the isocyanate-reactive component reduced the Flex Modulus of the polyurethane. The Heat Distortion Temperature of the polyurethanes made with the added soy-based polyol were comparable to or slightly better than the control.

Experiments 1 and 14-17

In Experiment 1, the control, no soy-based polyol was included in the isocyanate-reactive component.

In each of Experiments 14-17, the soy-based polyol (POLYOL A) was included in the isocyanate-reactive component in the amount indicated in TABLE B. In these Experiments, the soy-based polyol was used in substitution for a portion of POLYOL B (Experiments 14-16) or all of POLYOL B (Experiment 17) that had been used in control Experiment 1. The amount of isocyanate used remained relatively constant because the number of reactive hydroxyl groups in the isocyanate-reactive component remained relatively constant.

TABLE B

Experiment/ Material	1*	14	15	16	17*
SOY A (pbw)	0	15	25	35	45
SOY B (pbw)	0	0	0	0	0
SOY C (pbw)	0	0	0	0	0
POLYOL A (pbw)	55	55	55	55	55
POLYOL B (pbw)	45	30	20	10	0
DC 193 (pbw)	3	3	3	3	3
PU-1748 (pbw)	6	6	6	6	6
WATER (pbw)	0.7	0.7	0.7	0.7	0.7
% SOY[1]	0	13	21	30	38
HDT @ 66 psi (°C)	58	68	73	74	64
Compression Strength @ 25%	4474	4478	4583	4485	4359
Flex Modulus (10^3 psi)	161	178	175	171	150

pbw = parts by weight

* Comparative Example

[1]% SOY = wt% vegetable-based polyol in isocyanate-reactive mixture

As can be seen from TABLE B and Exhibit B, the Flex Modulus of the polyurethanes made with the soy-based polyol was higher than that of the control for each foam with the exception of the foam produced with an isocyanate-reactive component containing 38% soy-based polyol. Similarly, the Heat Distortion Temperature for the foams made with 13 wt%, 21 wt% and 30 wt% (based on total weight of isocyanate-reactive component) of the soy-based polyol was higher than that of the control (Experiment 1) and the foam made with an isocyanate-reactive component that included 38 wt% soy-based polyol (Experiment 17).

The improved Heat Distortion Temperature and Flex Modulus properties achieved when up to 30 wt% of the isocyanate-reactive component was a vegetable-based polyol could not have been expected from the teachings of either U.S. 6,180,686 or WO 00/23491.

5. CONCLUSIONS

As can be seen from the data presented in TABLE A and Exhibit A, just adding a vegetable-based polyol to a typical polyurethane-forming reaction mixture did not significantly improve the properties of the polyurethane.

It can be seen from the data presented in TABLE B and Exhibit B, that when a vegetable-derived polyol was used as a substitute for a portion of a polyether polyol of the type which is typically used in such formulations, polyurethanes having improved properties were obtained. More specifically, when a soy-based polyol is used in an amount greater than 0 and less than or equal to 30 wt%, polyurethanes characterized by higher Flex Moduli and Heat Distortion Temperatures than (a) the control in which no vegetable oil-derived polyol was used and (b) compositions in which greater than 30 wt% soy-based polyol was used were produced.

There is no teaching in either WO 00/23491 or U.S. Patent 6,180,686 which would lead one skilled in the art to expect such results.

6. The undersigned declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing therefrom.

Further Declarant Sayeth Not.

Signed at Pittsburgh, Pennsylvania, this 3rd day of MARCH, 2005.

Jan L. Clatty

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